Rising Water

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Put a candle in a saucer filled with water, light the candle and then cover it with a beaker. After the candle extinguishes, the water level suddenly increases. The purpose of our experiments is to determine the reason and the relevant parameters for this water level rise. In our research, we first introduced a temperature based physical model and a chemical one based on oxygen consumption to describe the phenomenon. Due to the expansion of gas inside the beaker, the simple experiment is not suitable for detailed research. An experimental setup that's capable of separating the two simultaneously occurring effects was introduced. The relevant parameters like the oxygen concentration for the chemical and temperature for the physical explanation were measured. Since a sudden water rise occurs, the water level was measured using a self--written video--tracker. The conducted experiments with different amounts of oxygen revealed that the final height of the water is only dependent on the amount of oxygen, and therefore only the chemical effect is important for the waters maximum height inside the beaker. Using an energetic approach, for the first time a theory was formulated to describe the gas temperature and the amount of oxygen in dependency of time. Using this, a complete time dependent simulation of the water level was developed, which matched the experimental values. Summarizing, the final height only depends on the oxygen based chemical effect. The history of the water level is influenced by the variation of temperature with time, i.e. the physical effect.

Awards Won:
Second Award of $2,000